(a) Show that the equation

$$3\sin 2x \tan 2x = \cos 2x + 2$$

Can be written in the form

$$4\cos^2 2x + 2\cos 2x - 3 = 0$$

(4)

(b) Find all values for x in the interval $0 \leq x < 180°$, for which

$$3\sin 2x \tan 2x = \cos 2x + 2$$

Give your answers to two decimal places.

(6)

Solve, for $0 \leq \theta < 180°$, the equation,

$$\sin(3\theta - 15) = 0.7$$

Give your answers to two decimal places.

(a) Show that

$$\frac{10\sin^2\theta - 7\cos\theta + 2}{3 + 2\cos\theta} \equiv 4 - 5\cos\theta$$

(4)

(b) Hence, or otherwise, solve, for $0 \leq x \leq 360°$, the equation

$$\frac{10\sin^2 x - 7\cos x + 2}{3 + 2\cos x} = 4 + 3\sin x$$

(3)

Solve, for $0 \leq x < 180°$, the equation,

$$\cos(2x + 15) = 0.3$$

Give your answers to one decimal place.

Solve, for $360° \leq x < 540°$,

$$12\sin^2 x + 7\cos x - 13 = 0$$

Give your answers to one decimal place.

(a) Show that the equation

$$4 \cos \theta - 1 = 2 \sin \theta \tan \theta$$

can be written in the form

$$6 \cos^2\theta - \cos \theta - 2 = 0$$

(4)

(b) Hence solve, for $0 \leq x < 90°$

$$4 \cos 3x - 1 = 2 \sin 3x \tan 3x$$

giving your answers, where appropriate, to one decimal place.
(*Solutions based entirely on graphical or numerical methods are not acceptable.*)

(4)

(a) Solve, for $-180° \leq x < 180°$, the equation

$$3 \sin^2 x + \sin x + 8 = 9 \cos^2 x$$

giving your answers to 2 decimal places.

(6)

(b) Hence find the smallest positive solution of the equation

$$3\sin^2(2\theta - 30°) + \sin(2\theta - 30°) + 8 = 9 \cos^2(2\theta - 30°)$$

giving your answer to 2 decimal places.

(2)

(i) Solve, for $-180° \leq \theta < 180°$,

$$(1 + \tan\theta)(5\sin\theta - 2) = 0.$$

(4)

(ii) Solve, for $0 \leq x < 360°$,

$$4\sin x = 3\tan x.$$

(6)

(a) Given that $\sin \theta = 5\cos \theta$, find the value of $\tan \theta$.

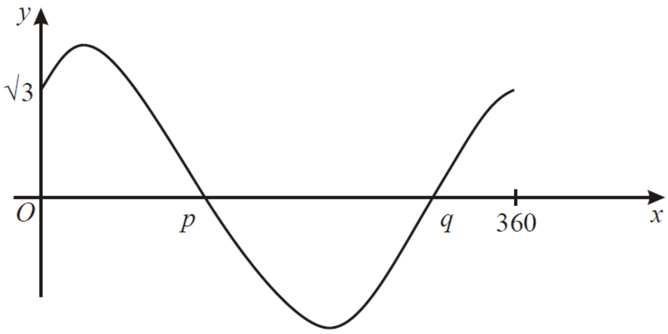
(1)

(b) Hence, or otherwise, find the values of θ in the interval $0 \leq \theta < 360°$ for which

$$\sin \theta = 5\cos \theta,$$

giving your answers to 1 decimal place.

(3)



The diagram above shows the curve with equation $y = k \sin (x + 60)°$, $0 \leq x \leq 360$, where k is a constant.

The curve meets the y-axis at $(0, \sqrt{3})$ and passes through the points $(p, 0)$ and $(q, 0)$.

(a) Show that $k = 2$.

(1)

(b) Write down the value of p and the value of q.

(2)

The line $y = -1.6$ meets the curve at the points A and B.

(c) Find the x-coordinates of A and B, giving your answers to 1 decimal place.

(5)

Prove that

$$\frac{\cos^2 x}{1-\sin x} \equiv 1 + \sin x, \quad \sin x \neq 1$$

$$\frac{1+\sin x}{\cos x} \equiv \frac{\cos x}{1-\sin x}, \quad \cos x \neq 0$$

a Prove the identity

$$(\cos x - \tan x)^2 + (\sin x + 1)^2 \equiv 2 + \tan^2 x.$$

Hence, find the values of x in the interval $0 \leq x \leq 360°$ for which

$$(\cos x - \tan x)^2 + (\sin x + 1)^2 = 3.$$